

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) A process comprising:
  - a) exposing a chemical species to nanoparticles such that said chemical species adsorbs physisorbs onto a surface of the nanoparticles as a chemical adsorbate, wherein such exposing is carried out as an exposure selected from the group consisting of a gas phase exposure, a solid phase exposure, and combinations thereof;
  - b) irradiating the nanoparticles comprising the chemical adsorbate with radiation;
  - c) detecting altered photoluminescence properties of the nanoparticles comprising the chemical adsorbate as a result of the chemical species being adsorbed physisorbed onto the surface of the nanoparticles; and
  - d) analyzing the altered photoluminescence properties by comparing to one or more pre-defined altered photoluminescence properties, to provide for an identifying of the chemical species.
2. (original) The process of claim 1, wherein the radiation comprises ultraviolet radiation.
3. (original) The process of claim 1, wherein the nanoparticles comprise quantum confined nanoparticles.
4. (original) The process of claim 1, wherein the nanoparticles comprise silicon nanoparticles.

5. (original) The process of claim 1, wherein the one or more pre-defined altered photoluminescence properties are provided by exposing nanoparticles having initial photoluminescence properties to one or more known chemical species.
6. (original) The process of claim 1, wherein the chemical species is selected from the group consisting of toxins, carcinogens, mutagens, lachrymators, flammable species, nerve agents, explosives, and combinations thereof.
7. (original) The process of claim 1, wherein the adsorption of a chemical species onto the surface of the nanoparticles comprises a reversible process.
8. (original) The process of claim 1, wherein the nanoparticles range in size from about 1 nm to about 100 nm.
9. (original) The process of claim 1, wherein the nanoparticles are present in an aerosol.
10. (original) The process of claim 1, wherein the detecting the altered photoluminescence properties comprises utilizing a wavelength selective detector.
11. (original) The process of claim 1, wherein the analyzing the altered photoluminescence properties comprises utilizing a wavelength selective detector.
12. (original) The process of claim 1, wherein the detecting and analyzing the altered photoluminescence properties comprises utilizing a spectrometer.

13. (original) The process of claim 1, wherein the detecting and analyzing the altered photoluminescence properties comprises utilizing an optical filter.

14. (original) The process of claim 1, wherein the nanoparticles are silicon nanocrystals.

15. (original) The process of claim 1, further comprising determining a concentration of the chemical species.

16-20. (cancelled)

21. (currently amended) A process comprising:

- a) exposing a chemical species to quantum-confined silicon nanoparticles such that said chemical species adsorbs physisorbs onto a surface of the quantum-confined silicon nanoparticles as a chemical adsorbate, wherein such exposing is carried out as an exposure selected from the group consisting of a gas phase exposure, a solid phase exposure, and combinations thereof;
- b) irradiating the quantum-confined silicon nanoparticles comprising the chemical adsorbate with ultraviolet radiation;
- c) detecting altered photoluminescence properties of the quantum-confined silicon nanoparticles comprising the chemical adsorbate as a result of the chemical species being adsorbed physisorbed onto the surface of the quantum-confined silicon nanoparticles; and
- d) analyzing the altered photoluminescence properties by comparing to one or more pre-defined altered photoluminescence properties, to provide for an identifying of the chemical species.

22. (previously presented) The process of claim 21, wherein the one or more pre-defined altered photoluminescence properties are provided by exposing quantum-confined silicon nanoparticles having initial photoluminescence properties to one or more known chemical species.
23. (previously presented) The process of claim 21, wherein the chemical species is selected from the group consisting of toxins, carcinogens, mutagens, lachrymators, flammable species, nerve agents, explosives, and combinations thereof.
24. (previously presented) The process of claim 21, wherein the adsorption of a chemical species onto a surface of the quantum-confined silicon nanoparticles comprises a reversible process.
25. (previously presented) The process of claim 21, wherein the detecting the altered photoluminescence properties comprises utilizing a wavelength selective detector.
26. (previously presented) The process of claim 21, wherein the analyzing the altered photoluminescence properties comprises utilizing a wavelength selective detector.
27. (previously presented) The process of claim 21, wherein the detecting and analyzing the altered photoluminescence properties comprises utilizing a spectrometer.
28. (previously presented) The process of claim 21, wherein the detecting and analyzing the altered photoluminescence properties comprises utilizing an optical filter.

29. (previously presented) The process of claim 21, further comprising determining a concentration of the chemical species.

30. (previously presented) The process of claim 21, wherein the step of exposing is carried out in the gas phase.